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AFRICAN BEES OF THE GENUS *HERIADES*

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The bees recorded below were obtained by the Cockerell-Mackie-Ogilvie Expedition of 1931–1932. The holotypes of the new species will all be found in The American Museum of Natural History. The genus *Heriades*, as commonly understood by European authors, includes some very diverse elements. The typical *Heriades* has spined axillae, after the manner of *Coelioxys*, and is widespread in both hemispheres. All those recorded in this paper have unarmed axillae, a series which in 1931 (Rev. Zool. Bot. Afr., XX, p. 336) I provisionally referred to a subgenus *Neotrypetes* Robertson, excluding however the new subgenus *Noteriades*, which perhaps deserves generic rank. Africa is extremely rich in species of *Heriades*, but in North America they are comparatively few. My friend Charles Michener, who is now revising the North American species, writes that they are all widespread, except *H. crawfordi* Graenicher, from Florida. Here the "age and area" principle may be said to operate, the genus on this continent, in the modern period, being very little prone to produce segregates. It was not always so, for in the Miocene shales of Florissant the species are numerous, as in Africa. *H. crawfordi* is quite closely allied to some of the African species.

The females of *Heriades* are usually to be distinguished by the characters of the mandibles, clypeus and basal band of metathorax. In *H.* (*Noteriades*) *bicornutus* Friese the mandibles are quadridentate, the innermost tooth (or dentiform angle) widely separated from the other three. The commonest type of mandible, shown by many species, is bidentate at the apex, with the inner angle obsolete or nearly so. But sometimes the inner angle is prominent though not dentiform (*H. livingstonei* Cockerell), or the mandible may be distinctly tridentate (*H. angustulus* Cockerell). In other species (as *H. pachygnathus* Cockerell) the broad mandible is edentate. The clypeal margin usually shows a series of nodules, which may number three or five, and may or may not be all alike. In *H. lobatus* Cockerell these structures are absent, but the species is by no means a typical *Heriades*. The basal band of metathorax has little cross-plicae, which may be dense and close, so that the surface is striate, or may be widely spaced, leaving

a series of shining pits. The ventral scopa is usually white, but it may be brassy yellow (*H. capicola* Strand) or red (*H. calviniensis* Cockerell). In some species the mandibles are red (*H. capensis* Friese). Some of the species are very small (*H. diminutus* Cockerell, the smallest, has the male about 3.2 mm. long), others quite large, up to *H. mamilliferus* Brauns (female 11–12 mm.). It is uncertain how much variation in size occurs within specific limits. In the present paper *H. civicus* is described, apparently different from the much larger *H. wellmani*, yet perhaps no more than a small variation. It is possible that large and small forms exist in the same regions, separated by different nesting habits, but it is also possible that the small individuals are the direct result of unfavorable conditions.

Heriades wellmani Cockerell, 1908 (**ciliatus** Friese, 1922)

Transvaal: Louis Trichardt, April 1932, 3 females (A. Mackie). A small species, with oblong head; clypeus and supraclypeal area very coarsely and densely punctured all over, the punctures running in lines; clypeal margin with three prominent tubercles, the middle one shorter and more obtuse; mandibles bidentate, the second tooth broad and obtuse; axillae not spined; scutellum highly polished, with a fringe of long hairs behind. It is a much stouter species than *H. campanularum* Kirby. This was compared with the type of *H. wellmani* from Angola, and I could not separate it. Friese's *H. ciliatus*, from Zululand and Bulawayo, S. Rhodesia, appears to be identical. In fresh specimens the white abdominal hair-bands are very distinct, though slender. The original description of *H. wellmani* failed to mention several important characters, so that Friese had reason for supposing *H. ciliatus* to be distinct. The type of *H. wellmani* is about 5.5 mm. long. I have a female of this size from Kloof Nek, Cape Town, Jan. 9, 1932 (A. Mackie), and can only refer it to *H. wellmani*. The type of the much smaller *H. civicus* was taken at the same time and place, and as the structural characters are about the same, it may be that *H. civicus* is really a variety of *H. wellmani*.

Heriades angustulus, new species

FEMALE.—Length about 4 mm., anterior wing 3 mm.; slender, black, with grayish wings and black stigma; tegulae very dark brown; axillae without spines, but a minute spine at each side of metathorax (compare *H. crawfordi* Graenicher). Head broad-oblong, with nearly parallel orbits; clypeus extremely densely and coarsely punctured all over, the punctures running in rows; clypeal margin trituberculate, the outer tubercles prominent, the middle one low and broad; supraclypeal

area and front very densely punctured, but upper margin of supraclypeal area shining; mandibles with apical half red, tridentate, the inner tooth sharp and prominent; no conspicuous hair on face; mesothorax and scutellum conspicuously shining, the mesothorax coarsely punctured in the same manner as the head, punctures of disc of scutellum well separated; postscutellum and base of metathorax finely wrinkled; second cubital cell long, receiving first recurrent nervure some distance from base; abdomen with narrow inconspicuous hair-bands on margins of tergites, most noticeable on third and fourth, lacking on fifth; ventral scopa white.

Cape Province: Oudtshoorn, Oct. 1931 (T. D. A. Cockerell). Differs from several small species (such as *H. larvatus* Friese and *H. matopensis* Cockerell) by the strongly tuberculate margin of clypeus. It is related to *H. wellmani* Cockerell, but the mandibles are quite different, more like those of *H. chariensis* Benoist, which has curved axillary spines.

Heriades angusticeps, new species

FEMALE.—Length about 4.5 mm., anterior wing 3 mm.; slender, black, the wings strongly dusky, but not reddish; mandibles, antennae and tegulae black; no axillary spines. Head very long, parallel-sided, in side view appearing almost as large as thorax, vertex strongly produced above eyes; clypeus densely and coarsely punctured all over, its lower margin arched, not tuberculate; front and upper part of sides of face with sparse hairs; mandibles bidentate at end, without salient inner angle (style of *H. truncorum* Linnaeus); head, thorax and abdomen closely and coarsely punctured, but shining between the punctures; scutellum large, polished, with well-separated punctures; stigma rather small; second cubital cell long, receiving first recurrent nervure far from base; tergites with slender inconspicuous hair-bands, lacking on fifth; ventral scopa pale yellowish.

Cape Province: Oudtshoorn, Oct. 1931 (J. Ogilvie). On first sorting out the specimens, this was confused with *H. angustulus*, but it is very different by the structure of mandibles and clypeus. The shape of the head at once separates it from *H. matopensis* Cockerell. The size agrees with *H. larvatus* Friese, which has the abdomen differently marked. The peculiar head is distinctive.

Heriades civicus, new species

FEMALE.—Length about 4.5 mm., anterior wing 3 mm.; black, with a broad-oblong head and rather short, robust, abdomen; mandibles and antennae black; tegulae dark brown; wings strongly dusky, stigma well developed, nervures pale brown, second cubital cell receiving the recurrent nervures about equally distant from (and close to) base and apex; no axillary spines; basal band of metathorax with coarse widely spaced plicae, the limiting margin with a double curve; basin of first tergite sharply defined. Head, thorax and abdomen coarsely punctured, but the punctures well separated on the shining discs of mesothorax and scutellum; no dense patches of white hair on face; clypeal margin with three very prominent tubercules, the middle one, though large, broadest and shortest; mandibles bidentate

at the faintly rufescent end, with no trace of an inner angle; tergites with a row of minute punctures along apical margin, but no hair-bands; ventral scopa white. There is a fringe of long hairs behind scutellum, as in *H. ciliatus* Friese.

Cape Province: Kloof Nek, Cape Town, Jan. 9, 1932 (Alice Mackie). Very similar to the two species described above; easily distinguished from *H. angusticeps* by the much shorter head and the tuberculate clypeus; from *H. angustulus* by the mandibles. Two females from Mitchell's Pass, Ceres (A. Mackie, J. Ogilvie), are larger and more robust (length 5 mm., anterior wing 3.6 mm.), but they have all the characters of *H. civicus*. It appears possible that *H. civicus* is only a variety of *H. wellmani*.

The species described as *Osmia dolichocephala* Friese (about 8 mm. long) seems to be related to these insects.

Heriades lobatus, new species

MALE.—Length about 7 mm.; anterior wing 4.8; robust, shining black, face covered with white hair; axillae not spined; abdomen turned downward at end, showing seven tergites, the sixth with a median keel, and a broad straight margin at each side with an angular lobe, so that seen from behind the tergite appears laterally dentate; seventh tergite forming a broad projecting semicircular lobe; no sternal processes, but two long fringes of yellowish hair. Mandibles, antennae and tegulae black; head, thorax and abdomen strongly punctured, but the punctures not dense; head transverse, broader than long, with a broad face; clypeus and supraclypeal area very coarsely punctured; clypeal margin straight and simple, except that at each extreme side there is a low shining lobe; mandibles with a stout apical tooth, grooved down the back, and a rudimentary inner one; antennae reaching base of scutellum; mesothorax and scutellum shining, with well-separated punctures on disc; base of metathorax fluted, with numerous short strong rugae; wings strongly reddened; stigma rather small; first recurrent nervure meeting first intercubitus; abdomen shining and strongly punctured, first three tergites with white hair-bands at sides; basin of first tergite well margined; fourth and fifth tergites very coarsely and closely punctured.

Cape Province: Calvinia, Nov. 11–16, 1931 (J. Ogilvie). A peculiar species, not a typical *Heriades*. I thought it might be the male of *H. laticeps* Cockerell, which was based on a female from Calvinia. Its general appearance is quite the same, but the quite different position of the first recurrent nervure, the much coarser punctures of abdomen, and other characters seem to preclude such a reference. In Friese's table of Palaearctic *Heriades* it falls nearest to *H. moricei* Friese, but on comparing specimens, there is little resemblance.

Heriades nodulosus, new species

FEMALE.—This is the species which I recorded (1932) from Calvinia as *H. chubbi* Cockerell, but on re-examination I find it distinct. The clypeal margin has

three large tubercles (style of *H. trigibbiferus* Brauns), whereas in *H. chubbi* (type examined) there are only extremely small tubercles, hardly noticeable under a high power. The mandibles are broad, strongly bidentate at end, but with no third tooth; axillae not spined; base of metathorax with coarse well-separated plicae, the plicate band with a strong rim behind; fifth tergite somewhat hoary with fine hair; abdominal hair-bands developed at sides of first two tergites, and entire on the next three; ventral scopa white, collecting lemon-yellow pollen. The wings are faintly grayish, a little darker at apex, but not reddened; stigma rather large; first recurrent nervure joining second cubital cell not very far from base. The mesothorax and scutellum are polished between the coarse punctures, which on mesothorax run largely in rows. Length, 7 mm.

Cape Province: Calvinia, Nov. 13, 1931 (Alice Mackie). It is distinctly more slender than *H. pachygnathus*, with quite different mandibles and clypeus. *H. trigibbiferus* is much larger, with red scopa. From Nieuwoudtville, Nov. 1931 (A. Mackie), come two males and two females of *H. nodulosus*. The males have a delicate sulcus down the front, and much pure white hair at sides of face; the first two tergites have white hair-bands at sides; there is a keel down the middle of the last tergite. The abdomen is obtuse at end as in related species.

Heriades multistriatus, new species

FEMALE.—Length about 7 mm., anterior wing 4.3 mm.; no axillary spines; basin of first tergite sharply bounded; ventral scopa pure white. Clypeal margin appearing straight and simple under a lens, but the microscope shows five little tubercles, all alike; mandibles with two apical teeth, and no inner angle; tegulae dark brown; wings strongly brownish, second cubital cell receiving first recurrent nervure far from base; basal band of metathorax densely striate, the area beyond the band showing a dull surface, without sculpture, under the microscope, but shining in certain lights under a lens; abdomen shining, the punctures smaller than on mesothorax; a cuneiform patch of dense white hair at each side of first tergite, and a little white hair at sides of margin of second. The clypeus and supraclypeal area are strongly punctured, but shining between the punctures. This is very like *H. chubbi* Cockerell from Natal (type compared), but *H. chubbi* has smaller tegulae, more closely and coarsely punctured mesothorax, shorter mandibles and apical tergite hoary with fine pale hair.

Cape Province: Calvinia, Nov. 11–16, 1931, seven females (J. Ogilvie, L. Ogilvie, A. Mackie, W. P. Cockerell).

Heriades pachygnathus, new species

FEMALE.—Aspect of *H. multistriatus*, and on superficial examination not separated from it, having the basal band of metathorax finely striate, and the ventral scopa shining white. The punctures of postscutellum are small and dense, smaller than those on scutellum. The differential characters are found in the mandibles and clypeus. The mandibles are broad like an axe-blade, except that the long entire margin is moderately oblique. The clypeus is very coarsely, densely, reticu-

lately punctured, and the lower margin is convex, with a broad but short rounded tubercle in middle, and a couple of little tubercles, very much smaller than the median one, on each side.

Cape Province: Calvinia, Nov. 11–16, 1931, two females (L. Ogilvie).

The following key will facilitate determination:

1.—Mandibles bidentate at end; last tergite hoary with fine pale hair. *chubbi* Cockerell.
Last tergite not hoary ..... 2.
2.—Mandibles long, bidentate at end ..... *multistriatus*, new species.
Mandibles broad, edentate ..... *pachygnathus*, new species.

Heriades chubbi Cockerell

Natal: National Park, three females (A. Mackie, J. Ogilvie). A male from the same locality (L. Ogilvie, March 1932) is referred here. In my key to Natal species (Ann. Durban Mus., 1920, p. 309) it runs out, having dark brown eyes and long flagellum. It is about 6.5 mm. long, anterior wing 4.6; wings dusky; pubescence white, forming a long beard over clypeus. The legs are ordinary. Abdomen obtuse and curved downward at end, as in related species; first tergite with a conspicuous white hair-band, the middle third of which is lacking; second tergite with an entire narrow band; third without a band; fourth with a fine band at sides; apical part of fifth with white hair. These abdominal characters distinguish it from *H. mandibularis* Friese, described from Natal (1922).

From the same locality (National Park), collected at the same time (March 1932) by the Ogilvies and Miss Mackie, come two females and four males which are appreciably larger and more robust than typical *H. chubbi*. I had set them aside as another species, but can only regard them as a larger variety. All the males show the entire hair-band on second tergite, and none at all on third. The base of the venter, in lateral view, shows a rounded prominence followed by a spine. Mixed with the females, but readily distinguished by the spined axillae, was a specimen of *H. marleyi* Cockerell. A male which I can only refer to *H. chubbi* is from Gum Tree, Orange Free State, Feb. 29 (A. Mackie).

Heriades speculiferus, new species

FEMALE.—Length about 8 mm.; black, including mandibles and antennae; tegulae very dark brown; wings strongly suffused with reddish brown; ventral scopa white; axillae not spined. Head large, with broad face, quite without patches of white hair; mandibles broad, edentate, the oblique cutting edge with a double

curve, the concave part innermost, the inner angle obtuse but distinct; clypeus densely and coarsely punctured, glistening between the punctures, the lower margin straight, with five small equal nodules, the apical corners elevated, forming conspicuous shining plates; supraclypeal area and front very densely punctured, vertex more sparsely, no trace of a frontal sulcus; cheeks very broad, rounded, with white hair beneath; thorax with very little hair, except about tubercles, and tufts behind wings; mesothorax and scutellum very coarsely punctured, but shining between the punctures; postscutellum with a brilliantly shining space on each side of the middle; basal band of metathorax with very minute irregular plicae; stigma well formed, black; second cubital cell receiving first recurrent nervure far from base, the second not so far from apex; abdomen shining, the punctures on first tergite rather small and close; basin of first tergite sharply defined; first two tergites with well-developed hair-bands at sides only, the abdomen otherwise not banded; apical tergite not hoary, its margin prominent.

Cape Province: Van Rhyn's Pass, Nov. 1931 (L. Ogilvie). A distinct species, to be compared with *H. pachygnathus* on account of the broad edentate mandibles, but the clypeus is quite different. The wings are much redder and the cheeks are broader than in *H. pachygnathus*.

Heriades arcuatellus, new species

FEMALE.—Length 4.5 mm., anterior wing 3 mm.; black, including mandibles and antennae, tegulae very dark brown; ventral scopa white; no axillary spines. Head broad-oblong; a little white hair at sides of face; mandibles short and broad, very briefly and obtusely bidentate apically, with no salient inner angle; clypeus densely punctured, but shining between the punctures, the lower margin arched, appearing simple when seen from below, but from above it is seen that there is a small but quite distinct median tubercle, and on each side of it, instead of similar tubercles, a long ridge; supraclypeal area shining but coarsely punctured; cheeks shining, in lateral view hardly as broad as eyes; front coarsely punctured, with a faintly indicated median sulcus; mesothorax coarsely punctured but shining; scutullem polished and sparsely punctured in middle; postscutellum highly polished in middle; basal band of metathorax with strong cross-plicae, not far apart; wings hyaline, slightly grayish, stigma well developed; second cubital cell receives first recurrent nervure not far from base; five hooks on hind wing; abdomen shining, second tergite with a conspicuous transverse sulcus; second to fourth tergites with very slender marginal bands of white hair, and some at sides of first; apical tergite shining between punctures, not appreciably hoary.

Cape Province: Blaukrans, near Calvinia, Oct. 1931 (Alice Mackie).

This is superficially like several other small species, but may be separated as follows (females):

1.—Head long, greatly produced above eyes.....*angusticeps* Cockerell.
Head not thus produced above eyes.....2.
2.—Head larger; wings not brownish.....*arcuatellus*, new species.
Head smaller; wings brownish.....3.

3.—Mandibles narrow, dark, bidentate at end.....*civicus* Cockerell.
Mandibles broader, with a salient inner angle, apical part dusky reddish.
angustulus Cockerell.

Heriades (Noteriades) bicornutus Friese

Belgian Congo (Katanga): Kafubu Mission, Sept. 1931, one female (A. Mackie). Compared with a specimen from Bulawayo, S. Rhodesia, determined by Friese. It is about 6.6 mm. long, the anterior wing 4.8 mm.